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(54) **Longitudinal cross-member for a vehicle seat**

(57) A longitudinal cross-member for a vehicle seat having an overturnable seat back whose inclination can be fixed by means of a rack disposed below the seat. This cross-member is formed by metal tube 1 of oval section flattened at both ends 2,3 and whose central region 7 is partially flattened. In the central region 7 there is formed, by punching the tube walls, a longitudinal toothed aperture 10 forming a rack.

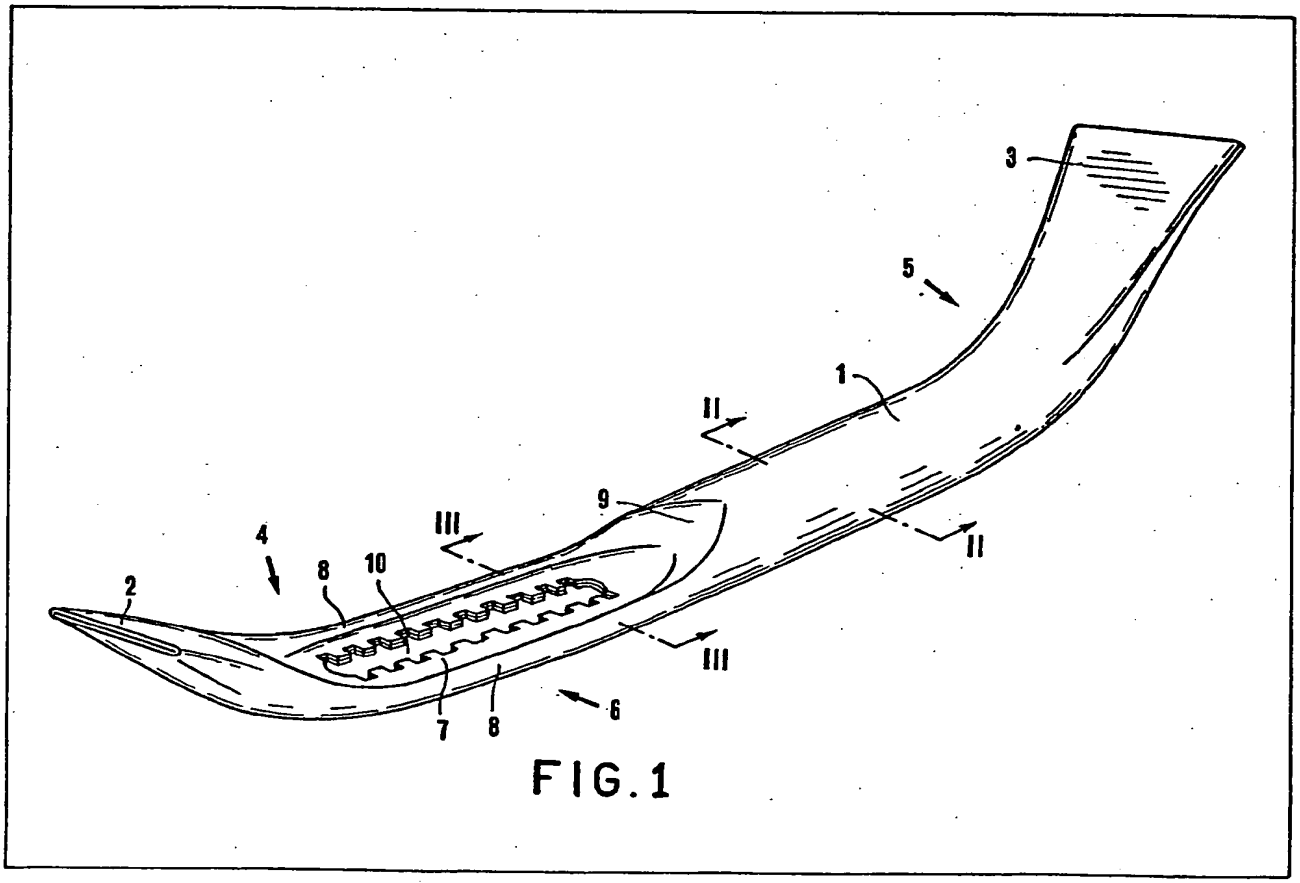

FIG.1

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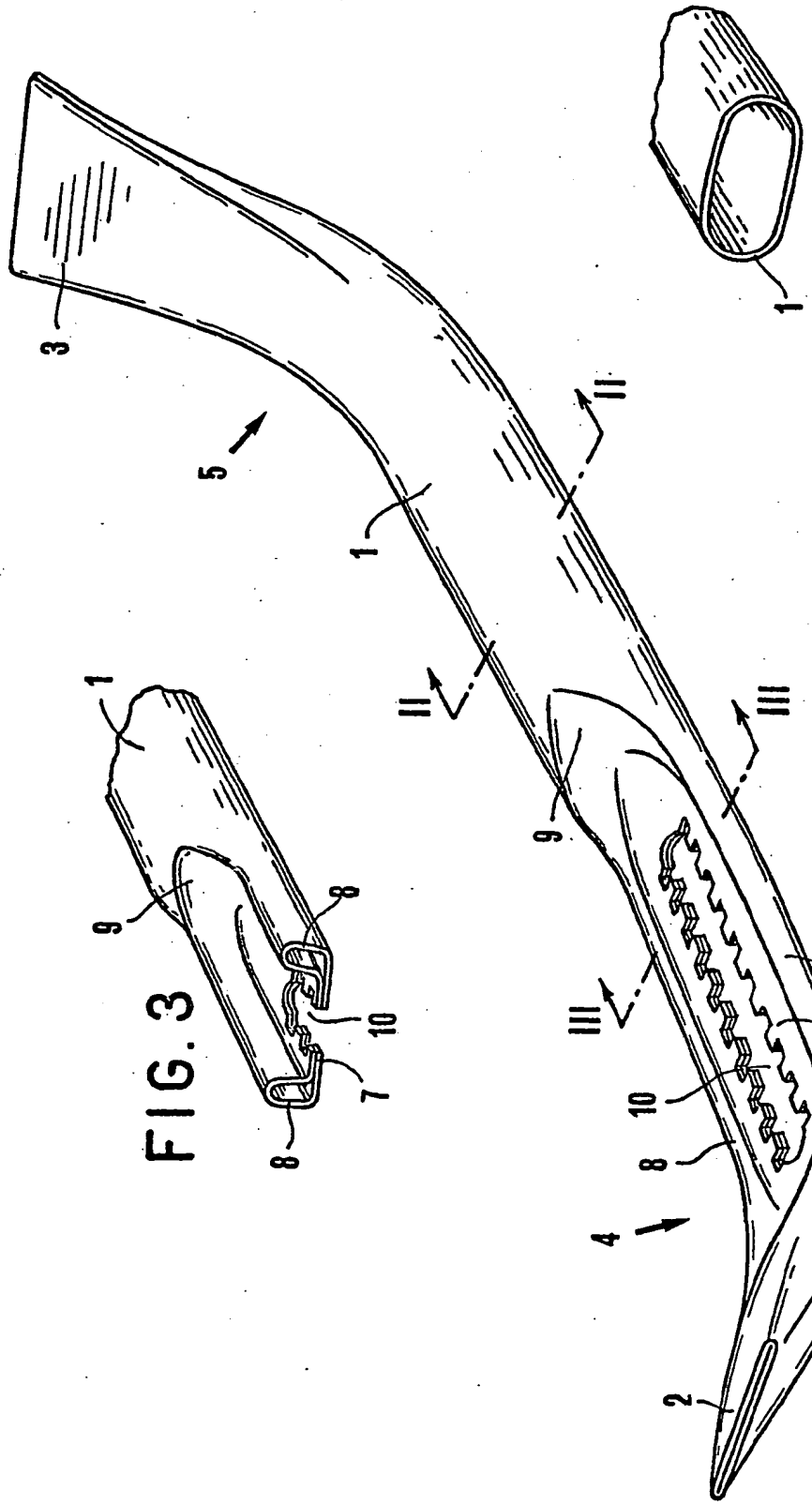

FIG.1

FIG.2

FIG.3

SPECIFICATION

Longitudinal tubular cross-member for a vehicle seat having an overturnable seat back

The present invention relates to the longitudianl cross-members for vehicle seats having an overturnable seat back whose inclination is adjusted and fixed by means of a bracket disposed below the seat and provided with engagement means which may cooperate in various positions with a rack provided on the stationary longitudinal cross-member. In the more improved constructions, the rack is formed by a longitudinal aperture whose side edges are provided with mutually facing toothings with which the bracket engagement means cooperate. Usually, this aperture with toothed edges is formed in a plate member which is welded to the cross-member made of a stamped plate and welded, at its front and back ends, to transversal elements of the structure of the seat.

This known construction has some disadvantages. First of all, the formation of the rack in a plate which has to be welded to the cross-member involves relatively high costs. The cross-member itself, made of stamped plate, results in being rather expensive. Furthermore, the sharp edges of the parts made of stamped plate may produce lesions on the hands of the workers during the assembly and on the hands of the persons who handle the bracket to adjust the inclination of the seat back, and damages to the shoes of the passengers seating on the rear seats.

It is an object of the present invention to provide a remedy to the disadvantages of the known construction of the type specified, and the innovative concept of this invention consists in making the longitudinal cross-member from an ovalized metal tube section shaped, squashed at its ends and, in addition, partially squashed in an intermediate elongate region in which there is formed, by punching, directly in the tube wall, which in this point has a double thickness, the longitudinal aperture provided with toothed edges which constitutes the rack intended to cooperate with the means of engagement of the bracket connected to the seat back.

A cross-member of this type may be very easily welded to the structure of the seat, thanks to the flattening of its ends, and, except in the rack, it has no sharp edges susceptible of injuring or damaging. The tube forming the cross-member may be relatively thin, in view of the increase of the resistance due to the tubular shape, and nevertheless it is adapted to directly constitute the rack, which for a correct behaviour must have a certain thickness, thanks to the fact that in the region in which the rack is formed the wall of the tube is of double thickness. The resistance of the tube within the rack may be maintained sufficiently high by squashing the tube only in a central portion which is comprised between tubular parts having a high resistance. The manufacturing of the tube may be carried out economically on automatic machines, and also the punching of the rack may be coordinated in a series of operations carried out automatically and the operation of welding the plate element to the rack is entirely eliminated, ensuring, in addition, in an absolute manner, the precision of the position of the rack relative to the longitudinal cross-member. In the successive operations of storing and manipulation for the connection to the structure of the seat, the tubular cross-member results in being much more practical than a cross-member made of stamped plate and minimizes the possibilities of accidents.

Thus, the use of the present invention permits to increase both the industrial economicity and the efficiency and practicity of application of the seat structure element formed by the longitudinal cross-member with rack for the adjustment of the inclination position of the seat back.

An embodiment of the cross-member according to the present invention, given by way of non limiting example, will now be described in detail with reference to the accompanying diagrammatic drawing, in which:

FIGURE 1 is a perspective view of the cross-member according to the present invention.

FIGURES 2 and 3 show two sections of the cross-member of Fig. 1, in a sectional view along lines II-II and III-III of Fig. 1, respectively.

The cross-member shown in the drawing is obtained from an ovalized metal tube section 1 having substantially the cross-section appearing from Fig. 2. This tube may be produced directly in its ovalized configuration, or it may be a normal tube of circular cross-section which is ovalized before manufacturing the cross-member, or also a tube of circular cross-section may be used which is ovalized during the formation of the cross-member. Also, the cutting of the tube 1 in pieces of suitable length may be carried out before the formation of the cross-member, or as an operation included into the formation process, prior to or after having carried out the flattenings described later.

The leading end 2 and the rear end 3 of the tube section 1 intended to form the cross-member are flattened in a substantially complete manner, thus providing end surfaces which are particularly suitable for being welded to front and rear transversal elements of the structure of the seat. In addition, in two regions 4 and 5 located sufficiently adjacent the ends 2 and 3, the tube 1 is curved in such a way that the ends 2 and 3 are situated at a level suitable for the connection to the structure of seat, whilst the intermediate portion of the tube section 1 is situated at the level suitable for the racks intended to cooperate with the engagement means of the bracket (not shown) which is articulated in a known manner to the seat back in order to fix it in a preselected position of inclination.

In a region 6, situated in the section comprised between the curved zones 4 and 5 and normally adjacent the front curved region 4, the tube 1 is partially flattened, in the sense that it is completely flattened in the central portion 7 to such an extent as to have its opposed walls in contact with one another, whilst the regions of the tube which extend sideways relative to this flattened portion form tubular portions 8 which enclose between them the flat portion 7, thus imparting to it a high resistance. The cross-section shape which the tube 1 assumes in this regions

appears from Fig. 3, and, as it can be seen, the flattening is carried out preferably in such a way that the flattened portion 7 defines a lower plane of the cross-member, in respect of which plane rise the tubular side portions 8. This arrangement facilitates the successive punching of the rack, however it is also conceivable to arrange for the tubular portions 8 to project on the lower part or partly above and partly below the plane of the flattened portion 7. This section extends a distance which is slightly greater than that required for the aperture with toothed edges which forms the rack, and at its ends it is radiused to the remaining oval section of the tube 1 by means of radiusing inclines 9. The aperture 10 provided with toothed edges, forming the rack, is directly punched in the flattened central portion 6 of the cross-member, where the double thickness of the material forming the tube ensures for the teeth of the rack a suitable thickness, in spite of the reduced thickness of the wall of the tube.

The length of the aperture 10 and the configuration of its teeth depend, obviously, on the range of adjustment pre-established for the seat back and on the lever ratio with which its bracket operates, and respectively on the shape of the engagement means with which the bracket is provided. The proportions of the longitudinal cross-element according to the present invention depend, on their turn, on the configuration of the structure of the seat for which the cross-member is intended. Therefore, various modifications may be made to what has been described hereinabove and shown in the drawing, in order to adapt the longitudinal cross-member to its various applications.

CLAIMS

1. A longitudinal cross-member for a vehicle seat having an overturnable seat back whose inclination is adjusted and fixed by means of a bracket disposed below the seat and provided with engagement means which may cooperate in various positions with a rack provided on the stationary longitudinal cross-member, characterized in that the longitudinal cross-member is formed by an ovalized metal tube section shaped, squashed at its ends and, in addition partially squashed in an intermediate elongate region in which there is formed, by punching, directly in the tube wall, which in this point has a double thickness, a longitudinal aperture provided with toothed edges which constitutes a rack.

2. A longitudinal cross-member as claimed in Claim 1, characterized in that in the said intermediate elongate region, in which the rack is formed, the tube is squashed in its central region to such an extent that the opposed walls of the tube are made to contact one another, and this central region is enclosed between tubular portions.

3. A longitudinal cross-member as claimed in Claim 2, characterized in that the said squashed central portion of the tube defines a plane, in respect of which are projecting, on one side only, the said tubular portions.

4. A longitudinal cross-member as claimed in Claim 1, characterized in that the said elongate region of the tube, partially squashed, is radiused by means of inclines to the remaining ovalized section of the tube.

5. A longitudinal cross-member as claimed in Claim 1, characterized in that the profiling of the tube consists in its being curved upwards in two regions adjacent the flattened ends, and that the partially squashed elongate region is located between the said two curved regions in a point situated more near the front curved region.

6. A longitudinal cross-member for a vehicle seat having an overturnable seat back, substantially as hereinbefore described with reference to the annexed drawing.

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